Claims

1. Composite material (10) of a substrate (1) with, applied to at least one side, a titanium oxide layer (2) with a chemical, physical, mechanical, catalytic and/or optical function,

characterised in that

on the substrate (1) is deposited a titanium oxide layer (2) of a base layer (3) of TiO_x with an oxygen content of $0.7 \leq x < 2$ or of $TiO_x(OH)_y$ with an oxygen content of $0.5 \leq x < 2$ and a hydroxide content of $0 \leq y < 0.7$ and on this base layer (3) is applied a top layer (4) of amorphous and/or crystalline TiO_2.

2. Composite material (10) according to claim 1, characterised in that the titanium oxide layer (2) has a total layer thickness of 3 to 1000 nm, where the top layer (4) comprises at least around 10% of the total layer (2).

3. Composite material (10) according to claim 2, characterised in that the titanium oxide layer (2) has a total layer thickness of 10 to 200 nm, preferably 20 to 150 nm.

4. Composite material (10) according to any of claims 1 to 3, characterised in that between the substrate (1) and the base layer (3) of the titanium oxide layer (2) is deposited a protective layer (7) of at least one of the metal oxides of the group comprising ZnO, MgO, ZrO_2, In_2O_3, Sb_2O_3, Al_2O_3 and SiO_2, and/or a polar adhesion layer, preferably with maximum the same layer thickness as the titanium oxide layer (2).

5. Composite material (10) according to any of claims 1 to 4, characterised in that the base layer (3) of TiO_x is mixed with at least one metal from the group comprising MgO, ZnO, ZrO_2, In_2O_3, Sb_2O_3, Al_2O_3 and/or SiO_2, and/or is doped with at least one metal oxide of the group comprising Fe_2O_3, WO_3,

MnO_2, NiO, BaO and/or CaO, where the total proportion of all metal oxides remains below 50 w.% and the total proportion of the metal oxides of the second group remains below 7 w.%.

6. Composite material (10) according to any of claims 1 to 5, characterised in that between the base layer (3) and the top layer (4) of the titanium oxide layer (2) is deposited an electrically conductive intermediate layer (5) which preferably comprises TiO_x with an oxygen content of $0.7 \leq x \leq 1.5$.

7. Composite material (10) according to any of claims 1 to 6, characterised in that at least the nine top atomic layers of the top layer (4) of the titanium oxide layer (2) mainly comprise the TiO_2 modification anatase.

8. Composite material (10) with a plastic substrate (1) according to any of claims 1 to 7, characterised in that preferably mixed with the plastic substrate (1), finely dispersed, are sub-micron filler particles (6) of a metal oxide or a metal hydroxide which dehydrates under heat.

9. Composite material (10) with a flammable substrate according to any of claims 1 to 8, characterised in that the TiO_x base layer (3) of the titanium oxide layer (2) has an oxygen content of $1.5 \leq x \leq 1.9$ or the $TiO_x(OH)_y$ has a significant hydroxide content of preferably $0.2 < y < 0.7$.

10. Process for deposition on a substrate (1) of a titanium oxide layer (2) with a chemical, physical, mechanical, catalytic and/or optical function,

characterised in that

first reactively or non-reactively a base layer (3) is deposited of TiO_x with an oxygen content of $0.7 \leq x < 2$, then by increasing the oxygen content, process pressure, power and/or substrate temperature a top layer (4) is deposited of an amorphous or crystalline TiO_2.

11. Process for deposition on a substrate (1) of a titanium oxide layer (2) with a chemical, physical, mechanical, catalytic and/or optical function,

characterised in that

in that first reactively or non-reactively a base layer (3) is deposited of TiO_x with an oxygen content of $0.7 \leq x < 2$ and then electrochemically, thermally and/or with a plasma process the surface is post-oxidized until the base layer (3) is restructured at least partly into a top layer (4) of amorphous or crystalline TiO_2.

12. Process according to claim 11, characterised in that a top layer (4) is deposited of TiO_2 doped with at least one metal oxide, preferably of the group comprising Fe_2O_3, WO_3, MnO_2, NiO, BaO and CaO, where in total less than 7 w.% doping is added.

13. Use of a composite material (10) with a plastic substrate (1) according to any of claims 1 to 12 to increase the thermal stability and flame inhibition of polymer materials in the form of films, membranes, fibres, powders, textiles, fabrics, tubes and containers.

14. Use of a composite material (10) according to any of claims 1 to 12 as active hygiene protection for the preparation of drinking water, watery solutions and air, for textiles, curtains, carpets, films, membranes, cables, packing, glassware, windows, composite materials, elements in medical technology, photovoltaics and optical systems, gas sensors and electronic circuits.